



Identifying Resident Birds

Pre-Visit Activities

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How Can I Learn About Birds at Point Reyes National Seashore?



Pre-Visit Lesson Plan

After reading a newspaper on birds of Point Reyes, students complete two activity sheets focusing on understanding and identifying birds. This activity will form the foundation for all other activities, including the on-site visit.

Time required: 2 hours

Location: classroom/homework

Suggested group size: entire class

Subjects: science, biology

Concepts covered: habitats, life cycles, adaptations, resource protection

Written by: Christie Denzel Anastasia, National Park Service

Last updated: 01/27/02

Student Outcomes

At the end of this activity, the students will be able to:

- Complete activity sheets based on their comprehension of the *Birds of Point Reyes National Seashore* Newspaper
- Understand how natural and human activities relate to bird populations and their habitats
- Understand the role and importance of students and Point Reyes National Seashore in conserving migrant and resident birds

California Science Standards Links (grades 6-8)

This activity is linked to the California Science Standards in the following areas:

- 6th grade
- 5a - food webs
 - 5b - organisms and the physical environment
 - 5e - resources available and abiotic factors
 - 7b - appropriate tools and technology to perform tests, collect data, and display data
 - 7c - develop qualitative statements about the relationships between variables





- 7th grade 3e - extinction of a species occurs when the environment changes and the adaptive characteristics for a species are insufficient for its survival
 5a - animals have levels of organization for structure and function
 5d - reproduction
 7a - appropriate tools and technology to perform tests, collect data, and display data
 7d - construct scale models and appropriately labeled diagrams to communicate scientific knowledge
- 8th grade 9b- evaluate the accuracy and reproducibility of data

National Science Standards Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A - Think critically and logically to make the relationship between evidence and explanations
- Content Standard C - Structure and function in living systems; Reproduction and heredity; Regulation and behavior; Populations and ecosystems; Diversity and adaptations of organisms
- Content Standard F - Science and technology in society

Materials

To be photocopied from this guide:

- **Pre- and Post-Evaluation** Activity Sheet
- *Birds of Point Reyes National Seashore* Newspaper
- **Vocabulary** sheets located in Teacher's Preparation/Attachments
- **Understanding Birds** Activity Sheet
- **Identifying Birds** Activity Sheet

Vocabulary

diversity, migrant, predator, site fidelity, territorial, vagrants

Procedures

1. Pre- and Post-Evaluation

Distribute **Pre- and Post-Evaluation** activity sheets. Remind students this is not a graded test, but rather a measure of our success; each student will retake the same test after several lessons. (Note: You may choose to save these completed tests and redistribute in the first post-visit lesson. Students change their answers based on what they have learned.)

2. Distribute Newspaper

Students receive and read *Birds of Point Reyes National Seashore* newspaper. Students can work in pairs or individually to complete activity sheets.

3. Reading Comprehension

Read the *Birds of Point Reyes National Seashore* newspaper as a class and clarify any questions or comments from students.



4. Activity Sheets

Give each student appropriate activity sheets, vocabulary list, and instructions for completion.

5. Conclusions

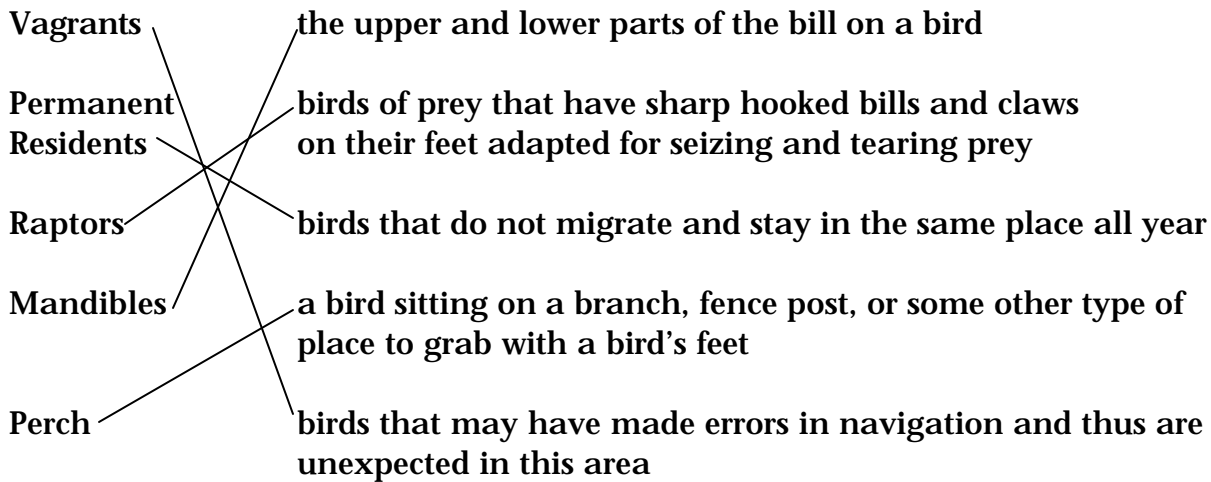
Review students' answers, exchange ideas, and relate these concepts to lessons already covered earlier in the year.



Pre- and Post-Evaluation

Vocabulary Match-Up

Draw connecting lines between words and their definitions.



True or False

Circle "T" for true, "F" for false.

- ☒ F Some birds migrate over 8,000 miles in one day.
☒ F Birds are believed to have evolved from reptiles related to dinosaurs.
☒ F Marin County has a healthy population of Northern spotted owls.
☐ T ☒ F All birds in Point Reyes National Seashore are native to the area.

Increase or Decrease

Do the following actions increase or decrease bird populations in an area? Place an "↑" to indicate increase, and a "↓" to indicate decrease next to each item.

- ↓ oil is spilled in the ocean next to a common murre colony
- ↑ people are informed about protection efforts involving birds
- ↓ habitat is destroyed
- ↑ western snowy plover nesting areas are protected and restored
- ↑ outside areas are made attractive to birds by improving backyard habitat
- ↓ bird eggs are broken or eaten by predators such as gulls, cats, or raccoons

National Park System

Which part of the National Park System is closest to where you live?

***Point Reyes National Seashore,
Golden Gate National Recreation Area, Muir Woods National Monument***

Stewardship

What can you do to preserve individual bird species, their populations, and the habitats they depend on? List your ideas on the back of this paper.

answers will vary



Pre- and Post-Evaluation

Vocabulary Match-Up

Draw connecting lines between words and their definitions.

Vagrants	the upper and lower parts of the bill on a bird
Permanent Residents	birds of prey that have sharp hooked bills and claws on their feet adapted for seizing and tearing prey
Raptors	birds that do not migrate and stay in the same place all year
Mandibles	a bird sitting on a branch, fence post, or some other type of place to grab with a bird's feet
Perch	birds that may have made errors in navigation and thus are unexpected in this area

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Circle "T" for true, "F" for false.

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 T/F Birds are believed to have evolved from reptiles related to dinosaurs.
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Anna's hummingbird

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Birds of Point Reyes National Seashore

Point Reyes National Seashore offers some of the finest birdwatching in the United States with more than 470 avian species observed in the Park and on adjacent waters.



Turkey vulture

- The Park's coastal location and its wealth of unspoiled habitats attract many migrating and wintering birds.
- The projection of the peninsula some 10 miles seaward from the geologic mainland makes Point Reyes National Seashore an attractive landing spot for many migrants and vagrants- birds that may have made errors in navigation and thus are unexpected in this area.
- All of these factors account for one of the highest species diversity in the nation during the annual Audubon Society sponsored Christmas Bird Count and attracts birdwatchers from around the world.

Why Study Birds?

Birds are everywhere! You can find birds in all habitat types around the world.

Birds are easy to hear. By singing their songs, they are announcing their names, over and over, all day long. Much of studying birds is done by hearing them, not even seeing them!

Birds are easy to locate. Since they are everywhere and make a lot of noise, we can easily find them by listening and looking with a pair of binoculars.

Studying birds can teach us about the health of ecosystems. The presence or absence of birds along with how well their population is producing young can indicate to us the health of a particular environment.

Migration...

Migratory Birds - Nature's Superheroes

Every year across the world, millions of birds must travel great distances to get to important destinations: their winter home and their nesting home. Traveling over land and sea using paths called flyways, this miraculous event is called migration. In North America, hundreds of thousands of migratory birds fly north to their nesting home in the spring and back south to reach their warmer winter homes in the fall. Some birds must travel over 8,000 miles - just one way - and some never make it to their destination.

The Busy Life of a Migrant

In a year of a migratory bird's life, it must fly to its nesting home in the spring, find a mate, build a nest, and raise its young. In the late summer or fall, when the young are just months old, the adults and young must safely fly to their winter home in the fall. That's a lot of work to do in such a short period, and there's often no time to waste!

How Do Birds Migrate?

Migratory birds are often physically adapted to fly huge distances. Long

wings and streamlined bodies help birds fly over vast ocean expanses using the wind to save energy. Eventually, however, many birds must stop to rest so that they can refuel with food and water. Incredibly, a small shorebird that nests in the Arctic, called a Western Sandpiper, feeds enough to nearly double its weight to fuel its migration. That's a big appetite! Some migrants travel alone, but many fly in enormous flocks. Perhaps you have noticed a flock of Canada Geese traveling in a "V" shaped formation over you. Since most migrating birds



Black-crowned night heron

journey at night and at high altitudes (2,000 to 8,000 feet above the ground), however, if you are not paying close attention, migration may slip right by you.

Neotropical Migrants - Birds With No Borders

Many migratory birds that nest in the USA and Canada have winter homes in the tropics - in countries from Mexico to Argentina - that are warm and full of food during our colder winter months. These special birds

are called neotropical migrants.

The Point Reyes Migration Pit Stop

Like truckers on a long highway, migrating birds are often familiar with good rest areas, and may use the same sites year after year. And like truckers birds need safe rest stops with enough food to fill their bellies so they can continue their travels. Not only is Point Reyes an important nesting and winter home for birds, the land and sea in and around it provide key rest areas for migratory birds. Many seabirds that nest as far south as New Zealand and as far north as the Bering Sea migrate to the waters off California, including Point Reyes, to feed during part of the year. Without safe rest stops, breeding homes, and wintering homes birds cannot complete their life cycle. Destructive human activities in these important places can disrupt the life cycle of birds if we are not careful. But we can help birds lead healthy lives by learning from our mistakes and changing our behavior.



Great blue heron

...and the Pacific Flyway

The Pacific Flyway is a stretch of sky and land that spans across the Pacific region of the United States, Canada, Central and South America. It is an airborne “highway” to millions of bird “commuters” that must migrate annually to and from their northern nesting grounds in Alaska and Canada.

These birds follow unmarked pathways, using guidance systems that surpass human instruments. Birds use sites along the flyways to feed, rest, or nest and rear their young. These birds migrate hundreds or even thousands of miles southward to their wintering grounds.



Adaptations

Most **feathers** can be classified into three main types: *down feathers* are short and fluffy to help keep the bird warm, *contour feathers* are only fluffy on the lower part and they help shape and protect the bird's body, and *flight feathers* are the longest, stiffest feathers.

Bill shapes and sizes vary greatly among birds. The bill can become highly specialized depending on how it is used. For example, oystercatchers have very stout, long bills used to get at their food enclosed in a shell. Other birds have short beaks that allow

them to open seeds and nuts easily.

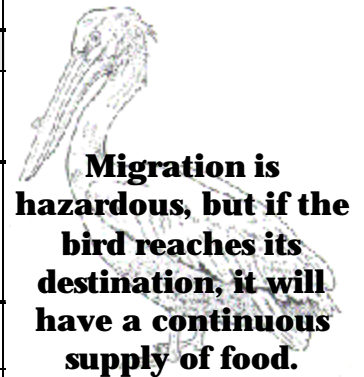
The sense of **smell** is developed to various degrees depending on the type of bird. Some birds can use their sense of smell to locate their burrows (Leach's petrels) while others are able to sniff out their favorite meal of earthworms (Kiwis). There are still many questions concerning the degree of smell in other species such as the vultures. No one really knows how they are able to find rotting food: smell, sight, or a combination of the two. Birds take on their

coloration through the pigments found in their feathers. Most of the bright, showy colors are used to attract members of the same species. Some coloration may have a protective purpose. Many shorebirds that are mostly white have black wing tips. These black pigments make wingtips stronger and may keep the wings protected during windy flights near the ocean.

The black brant flies up to 3,400 miles nonstop from Alaska to Baja California, averaging 60 miles per hour and arriving in less than two-and-a-half days. About 1/3 of the bird's weight is lost during this migration.

Migrant and Resident Birds

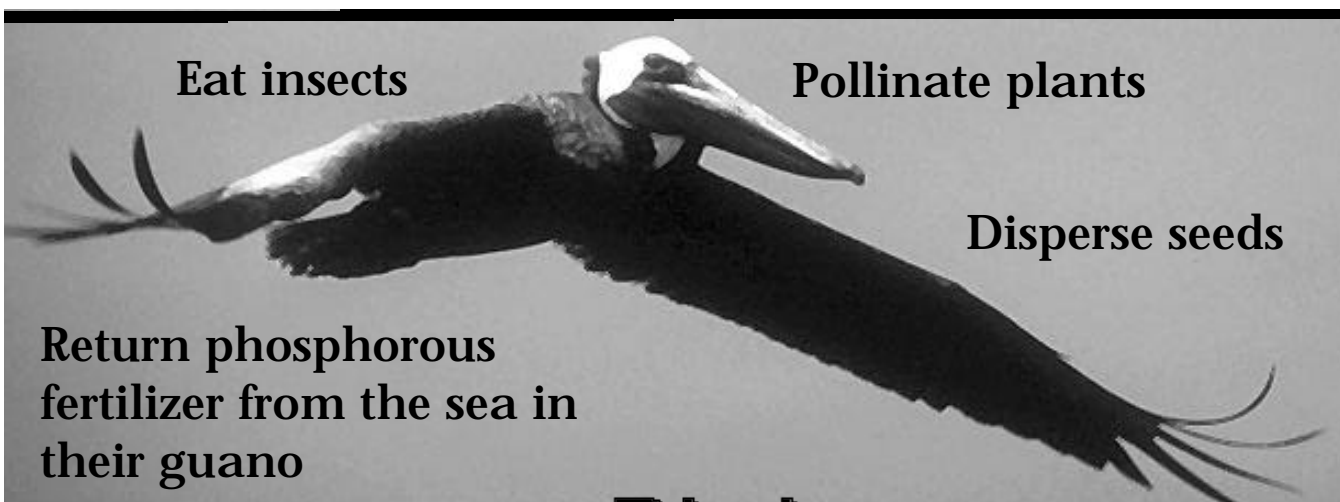
Ocean Habitats				
Habitats	SPRING/SUMMER		FALL WINTER	
	Resident Species	Migratory Species	Resident Species	Migratory Species
Ocean	Common murre Brandt's cormorant	Brown pelican	Common murre Brandt's cormorant	Common loon Canada goose Western grebe
Shore	Snowy egret Great egret Great blue heron Willet (non-breeders)	Willet (breeders)	Snowy egret Great egret Great blue heron Killdeer	Willet Marbled godwit Long-billed curlew American avocet Black-necked stilts
Intertidal	Black oystercatcher		Black oystercatcher	Black turnstone
Estuary/ Lagoon	Mallard Ruddy duck		Mallard Ruddy duck	American widgeon Northern pintail



Migration is hazardous, but if the bird reaches its destination, it will have a continuous supply of food.

Residents have two strategies: stay through the seasonal time of shortage and scrounge for food that is available; or harvest food during the time of supply for the time of need. Birds that store food have to be very careful, the food may be stolen or it may rot.

Land Habitats				
Nesting Habitat	SPRING/SUMMER		WINTER	
	Resident Species	Migratory Species	Resident Species	Migratory Species
Tops of Trees/ Canopy	Red-tailed hawk Osprey	Warbling vireo	Red-tailed hawk Osprey	Golden-crowned Kinglet Ruby-crowned kinglet Yellow-rumped warbler
Tree Trunks	Acorn woodpecker Northern flicker	Tree swallow Ash-throated flycatcher	Acorn woodpecker Northern flicker	
Shrubs	Scrub jay American robin	Black-headed grosbeak	Scrub jay American robin	Fox sparrow
Ground/ Understory	California quail California towhee	Wilson's warbler Swainson's thrush	California quail California towhee	Varied thrush Golden-crowned sparrow Fox sparrow



What Role do Birds Play in an Ecosystem?

What Is a Bird?

All birds have some type of feathers used for flight, protection, and body temperature regulation. All birds have feathers, and no other animal has feathers.

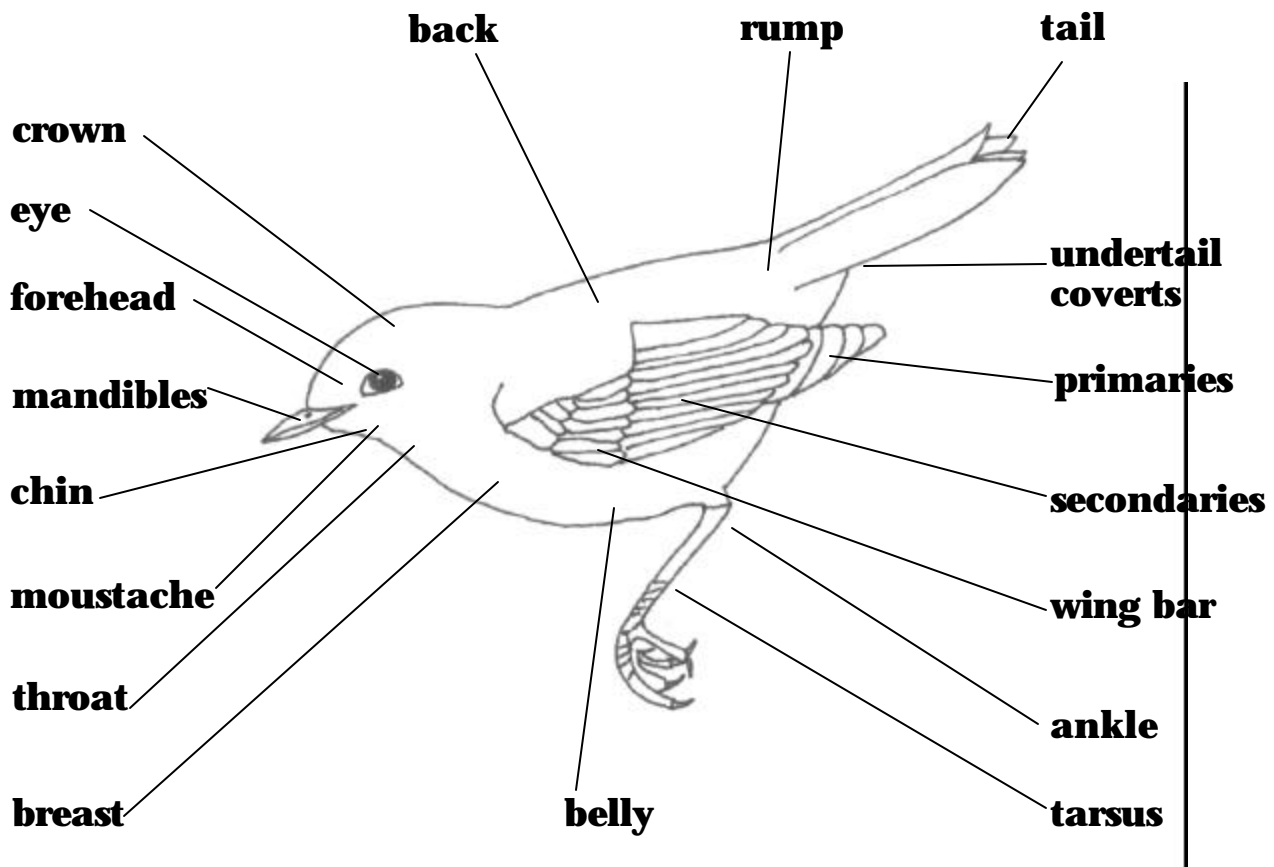
Birds have wings, which are modified forelimbs, for

flight. There are some flightless birds such as the ostriches and penguins. Their wings are used for other purposes, such as balance or swimming flippers.

Birds are warm-blooded

which means they can maintain a constant body temperature independent of the environment's temperature.

Birds have a backbone and internal skeleton making them vertebrates.



Birds are believed to have evolved from reptiles (related to dinosaurs) such as the fossil *Archaeopteryx* which had feathers.



A Rocky Life

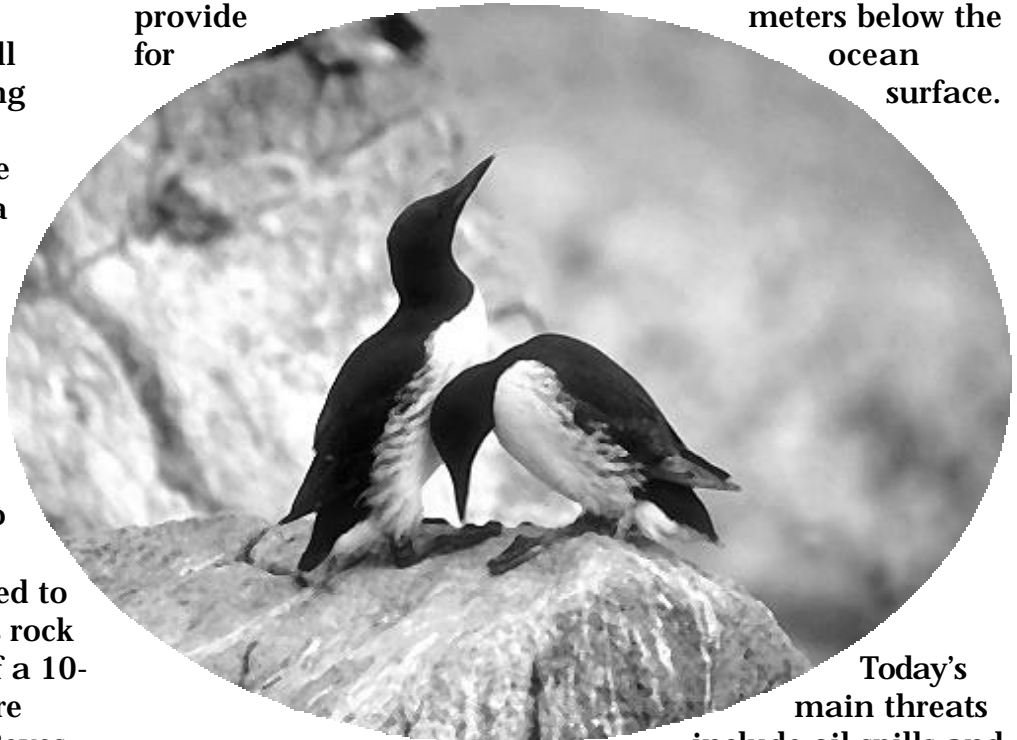
Though Common murre populations were decimated by egg collectors after the California gold rush, and again in the 1980's when approximately 75,000 were killed by gill-net fishing, you can still see these sturdy black and white birds breeding on the rock below the Point Reyes Lighthouse.

In 1986, a combination of ongoing commercial gill-net fishing and the Apex/Houston oil spill wiped out the breeding colony of over 3,000 murre at Devil's Slide Rock south of Pacifica and San Francisco. Court settlements in the form of monetary restitution for damages incurred by the spill are now allowing rehabilitation work to occur at Devil's Slide. No breeding is believed to have occurred on this rock since 1986. As part of a 10-year project, the murre population at Point Reyes will be used as a control site to monitor and compare the return of the Devil's Slide colony.

Common murrens return to nest on or near the same rock from which they fledged. In subsequent years they will not only return to the same rock, but

to the same spot on that rock to breed. This is why the work at Devil's Slide Rock is so crucial. Breeding for murrens begins at 4-6 years of age. Each season a pair lays only one pear-shaped egg. The shape of the egg ensures that if it rolls it will only go around in circles and not over the edge of the cliff. The low egg number allows a better success rate for the young but does not provide for

young bird for about 2 months. This time on the water together has two purposes. First, it allows the parents to use less energy feeding their young, since they do not have to fly back and forth to the top of the rock, and second, the adults can go through a molt (during which they cannot fly) without sacrificing care of the young. Propelled by their wings, murrens forage for fish by diving up to 180 meters below the ocean surface.



Common murre

a quick recovery of populations.

In mid-July when the fledgling is only about one-quarter of its adult weight, it leaps off the breeding rock and into the ocean, followed by its father. The father continues to feed the

Today's main threats include oil spills and disturbance from low-flying aircraft and boats. Overall, Common murre numbers in California are making a slow comeback. However, they have recently been listed by the state as a "species of concern" and have a long road to travel before their populations reach historic levels.

Plover Protection



Western snowy plover

Life History

Have you noticed a small shorebird running across the sand above the tideline when you visit the beach? Perhaps you saw it running across the sand with patter-stop movements, crouching in a depression, or feeding along the line of debris left by high tide. If it ran from you, spreading its wings, while flattening against the ground, you likely were too close to its nest or young.

The Western snowy plover (*Charadrius alexandrinus nivosus*) is a pale-colored, small shorebird. During the breeding season, the male has distinct black markings behind the eye, on the forehead, and on the shoulders. The female has similar markings that are dark brown.

The snowy plovers' nesting habitat is flat, unstable, open areas like dune-backed beaches and sandspits. Plovers breed from mid-March through mid-September, nesting in a depression in the sand constructed and lined with

bits of shell or pebbles. Both sexes share the month-long incubation of the eggs, with the female usually incubating during daylight hours and the male at night. Within hours of hatching, chicks leave the nest and are able to find their own food. The male will brood them and warn them of danger until they can fly. The female may leave to produce a second clutch with another male.

Reason for Decline

Snowy plover populations are declining along the Pacific Coast of the United States. Loss of habitat is the primary cause of their decline. There has been outright loss of habitat due to beach development for residential and recreational use. Introduced European beach grass and ice plant have also reduced plover nesting habitat by spreading over areas of open sand areas, and making beaches steeper and narrower. European beach grass, has also increased protective cover for predators of plover eggs and young.

Loss of nests and young is the second major cause of decline. Predators on eggs and chicks include gulls, crows, ravens, foxes,

coyotes, dogs, cats, skunks, opossums, hawks, and raccoons. Some nest loss to predators and weather is expected, but when it is combined with human disturbance, it can be devastating. Beach visitors, especially with dogs, horses, and vehicles, may not even realize that their presence could flush parents off nests, exposing eggs and young more often to predators, rain, and windblown sand. The greatest human use of the beach (Memorial Day through Labor Day) coincides with the plover breeding season. Well-camouflaged eggs, young, and even adults have been crushed by visitors to California beaches.

Special Status

Snowy plovers are listed as a federally threatened species due to continuing declines in breeding habitat and numbers of birds. At most, only 2,000 Snowy plovers nest along the coasts of Washington, Oregon, and California at present. Point Reyes National Seashore has a conservation plan which includes protecting and restoring nesting areas, monitoring plover populations (and predators), and informing people about protection and recovery efforts.

Northern Spotted Owls

Northern spotted owls (*Strix occidentalis caurina*) usually nest in large, old trees and multi-layered canopies typical of old-growth forests such as those of the Pacific Northwest. They are considered an indicator species because their presence is a gauge of the ecological health of the habitat.



Bird banding

This owl, which is recognized as threatened by the United States government, prospers in the mild climate of coastal California. Possibly the densest known population of Northern spotted owls is found on the public lands in Marin County. The abundance of spotted owls is probably due to a large population of their favorite prey, dusky-footed wood rats (*Neotoma fuscipes*).

Biologists and project volunteers from Point Reyes National Seashore, Golden Gate National Recreation Area,



Biologists measure tail feathers

Muir Woods National Monument, Point Reyes Bird Observatory and Marin Municipal Water District, and Open Space District monitor the population of spotted owls on public lands in the western portion of Marin County. Through long-term monitoring and banding programs, researchers study specific sites, reproductive success, and dispersal of local spotted owls.

Ravens with Antennas?

Look closely at the ravens you see perched on rocky bluffs and fence posts. You may see one with color bands on its legs. In 1998, 12 adult ravens were caught and banded, and 9 were fitted with a harness, small radio transmitter, and antenna. Color-coded antennas and leg bands identify each bird. Field biologists using radio receivers track the raven's movements.

Park biologists, the Point Reyes Bird Observatory,

Audubon Canyon Ranch, and the U.S. Fish and Wildlife Service hope to learn more about the foraging range and habitat preference of Common Ravens at Point Reyes. They are especially concerned with their predatory habits on Common murre colonies and Snowy plover nests at Point Reyes.

The raven is a natural predator in the ecosystem of Point Reyes, but the number of ravens may be artificially inflated due to

human-related activities, which increase food, water, and perch sites. More ravens mean other bird populations may decrease.



Common raven

Point Reyes Bird Observatory

The PRBO Conservation Science (PRBO) is an organization made up of many biologists who study birds, also known as ornithologists. The goal of PRBO is to use the information collected from studying birds to help conserve and protect birds in the environment they need to survive.



PRBO bird banding demonstration

Point Counts Using this survey, a biologist records the number of birds seen or heard at a designated point in a 5- minute period. The biologist is trying to get an estimate of how many birds are in an area, as well as what different kinds of birds are present.

Mist netting This is a method where birds are safely caught in a large nylon net called a mist net in order to be studied. Once the bird is carefully removed from the net, a metal identification band with a number is placed on its leg. Then the bird is measured, weighed, and released safely back into the wild. No two birds in North America have the same number! Mist netting can teach us how long birds live, where they migrate to, and what types of birds are in an area.

Bird Banding The United State Fish and Wildlife Service's Bird Banding Laboratory distributes millions of small metal bands to bird observatories across the nation. Each band is marked with a unique identification number that will be used to gather information about the bird it is attached to. When birds are recaptured by bird banders, found dead, or shot by hunters, information is recorded and sent back to the Bird Banding Laboratory. Researchers are able to learn more about such things as migration patterns and species longevity. Over a million birds are banded annually in North America and about 65,000 bands are recovered.

Nest Monitoring This method for studying birds is like being a detective! A biologist watches birds for clues about where they have hidden their nests. The clues are behaviors the birds perform. Noting these behaviors helps the biologist find the nest. Once found, the biologist carefully monitors or checks the nest every 4 days to see what happens to it. Nest monitoring can teach us how successful birds are at reproducing. And remember, if birds aren't reproducing, their populations will decline. We can also learn how long it takes for chicks to grow to adults, what kinds of predators are preying on birds in the nest, and what type of habitat birds need to build their nests.

Field Observations Perhaps one of the most important ways to study birds is to keep track of observations in a field journal or notebook. Every time biologists are out watching or studying birds, they record everything they see in their notebooks. This includes information such as where they are, what the weather is like, the time of day they saw something, as well as sketches of birds, habitats, and anything else they may encounter.

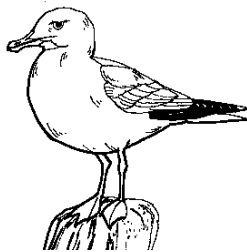
Special Birds

Species of Special Concern



California brown pelican

Northern spotted owl
Western snowy plover
Bald eagle
California brown pelican



Environmental Indicators

Birds are “vital signs” of the environment, meaning they are excellent indicators of changing conditions in the natural world. Like ourselves, birds are at the top of many food webs. In addition, their high metabolic rates make them particularly sensitive to stress or habitat degradation. Birds also serve as indicators of levels of pollutants concentrated in the food chain. These pollutants can potentially impact a birds reproductive success and productivity.

Nonnatives at Point Reyes National Seashore



Rock dove
European starling
House sparrow
Peacock
Wild turkey
Mute swan



Stewardship

What You Can Do to Help Birds and Their Habitats:



- Eliminate poisons in your yard. Many popular pesticides are lethal to birds.
- Attach falcon or owl silhouettes to large windows to help birds distinguish between real sky and the reflection in the window. Millions of birds each year are killed when they fly into windows.
- Consider that cats have never been in the natural food chain in the Western hemisphere. Free-roaming cats kill hundreds of millions of migratory songbirds each year.
- Make outside areas attractive to birds by planting native plants.
- Volunteer...contact local parks, forests, and refuges to learn more about volunteer opportunities.

How You Can Protect Plovers:

- Keep pets leashed, and away from restricted areas. If you are not sure where to go, ask a ranger.
- Keep clear of protective fencing, called “exclosures.” They are made of metal fencing or rope.
- Walk on wet sand near the surf, especially during the summer breeding months. It is easier on your feet and keeps you away from the dry sand habitat of plovers.
- Remove all food and trash from beaches to discourage scavenging predators.
- Leave driftwood posts lying on the sand. These upright posts provide perches for avian predators.
- Become a Snowy Plover Docent and help teach others about plovers and beach habitat.



Western snowy plover, Lisa Halton

Special Thanks



Point Reyes Bird Observatory
Melissa Pitkin, Sue Abbott, Rich Stallcup

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Editor: **John Dell'Osso**

Understanding Birds



Use the information in the "Birds of Point Reyes National Seashore" newspaper to answer the questions below.

Common Murres and Western Snowy Plovers

	Reasons for Decline	Actions Taken to Protect Population
Common Murres	<i>egg collection</i> <i>gill net fishing</i> <i>oil spills</i> <i>disturbance from low flying aircraft</i>	<i>rehabilitation work at damaged sites</i> <i>monitoring "control" sites</i>
Western Snowy Plovers	<i>loss of suitable coastal habitat</i> <i>introduction of non-native coastal plants</i> <i>loss of nests, eggs, and young</i> <i>humans scare parents off nests</i>	<i>protecting and restoring nesting areas</i> <i>monitoring populations</i> <i>informing people about protection and recovery efforts</i>

Northern Spotted Owl

Why are Northern spotted owls doing well in Marin County?

- **Large numbers of their favorite prey are present (dusky footed woodrat)**
- **Suitable habitat**

What are researchers studying about Northern spotted owls?

- **Site fidelity (how consistently birds are in returning to the same site)**
- **Reproductive success**
- **Dispersal of local owls**

How are researchers studying Northern spotted owls?

- **Long-term monitoring (knowing locations and numbers)**
- **Bird banding (recognition of individuals and correlation with site)**

Ravens

What are researchers studying about ravens?

- **Foraging range (where and how do they feed)**
- **Habitat preference**
- **Predatory habits on common murre colonies**

How are researchers studying ravens?

- **Antennas, radio transmitter, radio receivers**
- **Leg bands**

Name _____ Date _____



Birds of Point Reyes National Seashore Newspaper Activity

Understanding Birds

Use the information in the "Birds of Point Reyes National Seashore" newspaper to answer the questions below.

Common Murres and Western Snowy Plovers

	Reasons for Decline	Actions Taken to Protect Population
Common Murres		
Western Snowy Plovers		

Northern Spotted Owl

Why are Northern spotted owls doing well in Marin County?

What are researchers studying about Northern spotted owls?

How are researchers studying Northern spotted owls?

Ravens

What are researchers studying about ravens?

How are researchers studying ravens?

Identifying Birds

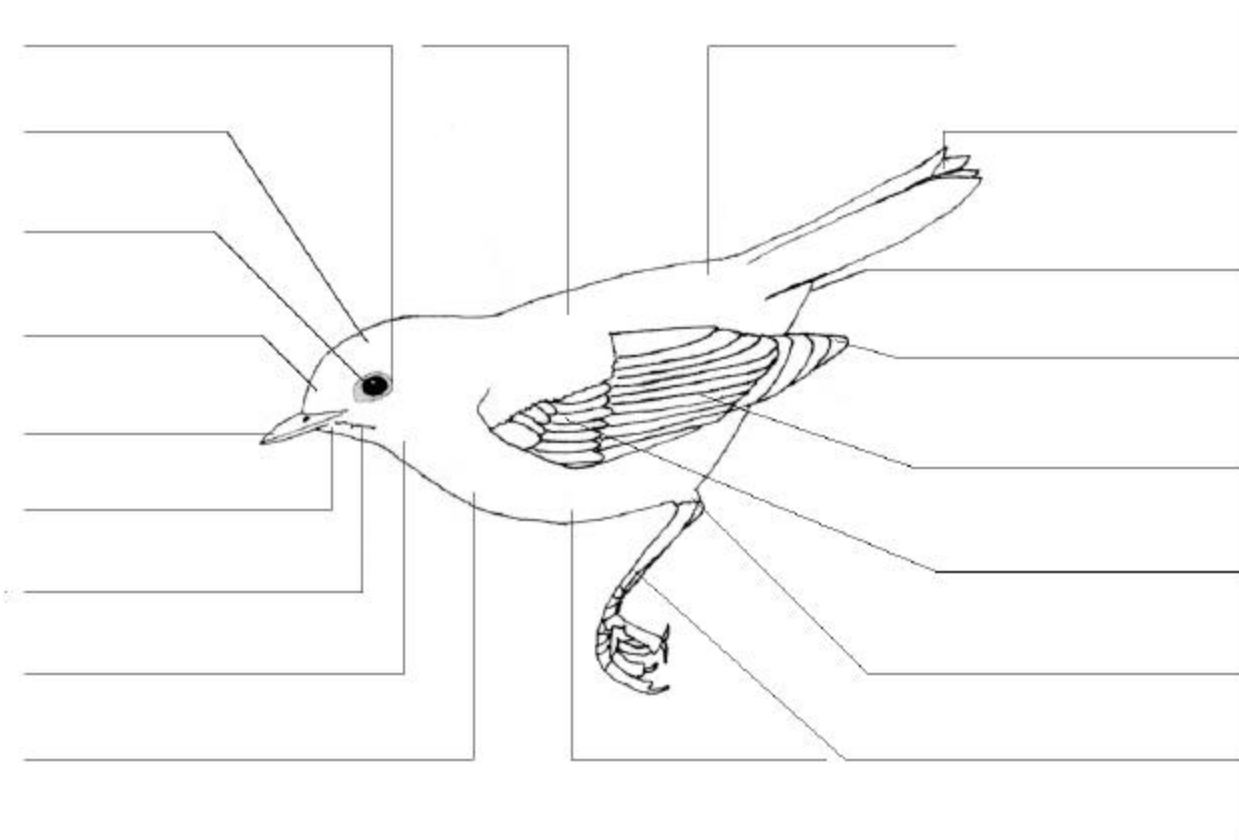


Study the picture of a bird in the "Birds of Point Reyes National Seashore" newspaper showing specific parts used to identify birds. Close the newspaper and try to label the bird with the words listed in the box below.

If you can learn to identify these parts, it will help you use a field guide and discover the names of birds. If you know what bird you are looking at, you can learn more about the bird in a book, and understand the habitat the bird needs to survive.

Remember to save this sheet of paper to include in your field journal for your visit to Point Reyes National Seashore!

tarsus - belly - rump - tail - eye ring - crown - breast - ankle -
primaries - wing bar - mandibles - eye - back - chin - secondaries -
forehead - undertail coverts - moustache - throat



What Resident Birds Can I Easily Identify ?



Pre-Visit Lesson Plan

Student teams will research a specific resident bird and present findings to their class. The five resident birds students will study are among the most likely to be viewed and recognized during their upcoming field trip.

Time required: 2 hours with possible homework assignment

Location: classroom, library

Suggested group size: entire class

Subject: ornithology

Concepts covered: field guides, bird identification

Written by: Lynda Doucette and Daisy Martin, National Park Service

Last updated: 07/06/01

Student Outcomes

At the end of this activity, the students will be able to:

- Familiarize themselves and fellow class members to five most common bird species to be seen on future field visit
- Complete journal pages for identification of birds on the field trip

California Science Standards Links (grades 6-8)

This activity is linked to the California Science Standards in the following areas:

- | | |
|-----------|---|
| 6th grade | 5c - organisms can be categorized by functions
5e - the number and types of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperature, and soil composition
7b - appropriate tools and technology to perform tests, collect and display data |
| 7th grade | 7a - appropriate tools and technology to perform tests, collect and display data
7b - utilize a variety of print and electronic resources. |

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National Science Standards Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A - Identify questions that can be answered through scientific investigation; Use appropriate tools and techniques to gather, analyze, and interpret data
- Content Standard C - Reproduction and heredity; Regulation and behavior; Populations and ecosystems; Diversity and adaptations of organisms
- Content Standard F - Populations, resources, and environments

Materials

To be provided by the teacher:

- Research materials such as books, field guides, Internet access

To be photocopied from this guide:

- **Bird Identification** Field Journal Sheet (five per student)

Vocabulary

generated by student inquiry

Procedures

1. Introduction

Start by discussing the natural history of a bird that most students have seen (robin, raven, gull). Describe its size, physical characteristics, habitat, flight, voice, nest, eggs, and differences between males/females.

2. Distribute Field Journal Sheets

Hand out **Bird Identification** Field Journal Sheet (one per student) to explain that these characteristics apply to all birds. Break students up into at least five groups to represent the following species:

turkey vulture
Brewers blackbird
red-tailed hawk
acorn woodpecker
California quail

Research using various field guides, books, and the Internet will allow teams to fill in the worksheet. Each group should also locate or draw a picture of their bird. Explain to the students that each group will present its findings to the entire class.

3. Student Presentations

Distribute additional **Bird Identification** Field Journal Sheets prior to presentations (four per student). Have each group give a 5-minute presentation to the class on its bird species. While each group is giving its presentation, other students should record the information on their **Bird Identification** Field



Journal Sheets. The goal is for each student to have five **Bird Identification** Field Journal Sheets (one per bird species) to be included in their field journal.

4. Review

Following the completion of these presentations, discuss the concept of "niches". Compare and contrast the similarities and differences between the five bird species (feeding strategies, food sources, nesting locations, primary habitats). Emphasize that understanding these niches will assist students with field identification of these birds.

NOTE: All **Bird Identification** Field Journal Sheets will be incorporated into the students' field journal. Collect the sheets and hold until lesson "What Can We Expect on Our Field Trip to Observe Birds?" or ask the students to keep them someplace where they'll be able to locate the sheets again.

Extension Ideas

1. Introduce the concept of how birds receive their scientific name. Refer to the information below regarding the five species that were researched in this lesson.

Turkey vulture *Cathartes aura*
(*Cathartes* =Greek: "a purifier"; *aura* ="golden")

Red-tailed hawk *Buteo jamaicensis*
(*Buteo* =Latin "a hawk"; *jamaicensis* ="of jamaica": site of original specimen)

Acorn woodpecker *Melanerpes formicivorus*
(*Melanerpes* =Greek *melas* "black"+ Greek *herpes* "a creeper"; *formica*= Latin "an ant"+ Latin *vero* "devour")

Brewer's blackbird *Euphagus cyanocephalus*
(*Euphagus* = Greek *eu* "good" + Greek *phago* "to eat"; *cyanocephalus* =Greek *cyanos* "blue"+ Greek *cephale* "head")

California quail *Callipepla californica*
(*Callipepla* = Greek *kallos* "a beauty" + Greek *peplos* "a robe"; *californica*= the range)

(source: The Dictionary of American Bird Names, Ernest A. Choate)

Bird Identification



Field Journal Sheet

Below are listed categories that bird field guides often include in their descriptions of birds. Research the information for your group's bird and fill in the blanks. Use the back side of this paper to sketch your bird and label the distinguishing characteristics you might look for if you were bird watching in the field.

Common name:

Latin name:

Size:

Physical description: (Note differences between males and females)

Habitat:

Diet:

Flight:

Voice:

Nest:

Eggs:

Bird Identification



Teacher Information

Turkey vulture

(*Cathartes aura*)

Size:	26-32 inches
Description:	Black body, red head and legs. Immature birds have black or gray head. Large wing span, sometimes over 6 feet. In sky, note the two-tone black wings on underside. Females and males look alike.
Habitat:	Open areas in lowlands and mountains.
Diet:	Any dead animal from large to small.
Flight:	Soars with wings in a slight "v" shape. Rocks and tilts.
Voice:	Rarely heard hiss, grunts or growl.
Nest:	No nest. Will use caves or stumps. Sometimes loosely rakes together leaves, dirt, and wood chips.
Eggs:	2.8 inches, white

Red-tailed hawk

(*Buteo jamaicensis*)

Size:	19-25 inches
Description:	Large, stocky bird with dark brown back. Adults have light breasts in the summer and darken in the winter. Topside of tail is a bright orange-red in direct light. Immature birds have less coloration on the tail. Females and males look alike.
Habitat:	Open country and woodlands. Perch in plain sight in trees and on telephone poles and fences.
Diet:	Small mammals, birds, fish and reptiles
Flight:	Soars, hovers, and dives
Voice:	High pitched "keeeeer-r-r"
Nest:	In high places with good views, made of large sticks and twigs, lined with bark, evergreen sprigs, and green leaves.
Eggs:	2.4 inches, white or bluish, sometimes with brown spots.

Acorn woodpecker

(*Melanerpes formicivorus*)

Size:	8.5-9.5 inches
Description:	Black back with white on the rump and white patches on the wings easily seen when flying. Head is topped with red with black surrounding the eyes and yellow or cream near the bill and throat. Male and female look similar. (Female has a black



bar between red and white on head; male's red crown meets the white directly.)

- Habitat:** Oak groves, mixed forest, oak and pine canyons, and foothills.
Diet: Eats acorns it collects and stores in the bark of trees. Also insects, fruit, sap, and corn.
Flight: Short spurts, often lands on fenceposts and trees.
Voice: "Whack-up, whack-up, whack-up" or "ja-cob, ja-cob."
Nest: Usually in a snag or on poles. Lined with wood chips.
Eggs: 1.0 inch, white

Brewer's blackbird
(*Euphagus cyanocephalus*)

- Size:** 9 inches
Description: Males: all black with iridescent sheen and yellow eye. Females: brownish gray with dark eye.
Habitat: Fields, prairies, farms, and parks.
Diet: Spiders, insects, crustaceans, snails, grass, and some seeds.
Flight: Short flights, found in flocks.
Voice: Song, creaking "ksh-ee," sometimes a short "chack"
Nests: Comprised of twigs, grass, mud, or cow dung, and lined with fine materials. Locations vary.
Eggs: 1.0 inch, gray with brown markings.

California quail
(*Callipepla californica*)

- Size:** 9.5-11 inches
Description: Small, plump, chicken-like bird with a short, curved black plume on the head. Male has black and white face and throat. Female: duller browns.
Habitat: Shrubs, woodland edges, coastal scrub, and farms.
Diet: Seeds, plants, acorns, fruit, insects, spiders, and snails.
Flight: Short and low to the ground.
Voice: Loud "chi-ca-go," also soft clucking.
Nest: Shallow, covered depression lined with leaves and grass.
Eggs: 1.2 inches, cream-colored with dull brown markings.

What Can We Expect on Our Field Trip to Observe Birds?



Pre-Visit Lesson Plan

Students will construct and review their personal field journals to prepare for upcoming field visit. Students should be comfortable with the types of information they will be responsible for collecting. This will allow the field trip to be focused on observation rather than instruction.

Time required: 1 hour

Location: classroom

Suggested group size: entire class

Subjects: science, math, writing

Concepts covered: bird identification and behaviors

Written by: Christie Denzel Anastasia, National Park Service

Last updated: 07/06/01

Student Outcome:

At the end of this activity, the students will be able to:

- Utilize field journals while viewing birds

California Science Standards Links (grades 6-8)

This activity is linked to the California Science Standards in the following areas:

- 6th grade 7a - select and use appropriate tools and technology to perform tests, collect data, and display data
 7h - identify changes in natural phenomena over time without manipulating the phenomena
- 7th grade 7a - select and use appropriate tools and technology to perform tests, collect data, and display data
- 8th grade 9b - evaluate the accuracy and reproducibility of data

National Science Standards Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A - Use appropriate tools and techniques to gather, analyze, and interpret data; Understanding about scientific inquiry



- Content Standard G - Science as a human endeavor; Nature of science: students formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models

Materials

To be photocopied from this guide:

- Field journals for each student, teacher, and chaperone
- Optional: Field Journal Sheets from on-site lesson **How Can I Capture My Experiences in a Story, Poem, or Drawing?**

Available for reservation at Bear Valley Visitor Center:

- Resident Birds Kit

Procedures

1. Preview Field Trip Logistics

See the on-site journal activity instructions for **What Is the Diversity of Birds Found at Point Reyes National Seashore?** This will give you an idea of what to expect on the day of the field visit.

2. Students Construct Their Field Journals

Hand out photocopies of the field journal sheets and have students assemble their field journals. Remember to include **Identifying Birds** (page 49) and **Bird Identification** (page 55) Field Journal Sheets from pre-visit lessons. Also, refer to the attached sheet for **Tips for Constructing Field Journals.**)

3. Review Field Activities

Have students turn to appropriate page in their journal as you review expectations.

- **Things to Remember While on Resident Birds Field Trip**
This will be filled out after the next pre-visit lesson "Safety and Stewardship Challenge."
- **Code of Birding Ethics**
Review with students.
- **Watch Out for These Three Things**
Review with students.
- **Bear Valley Visitor Center Birds, Bird #1 and Bird #2**
Students will complete these field journal sheets for two taxidermy birds in the Bear Valley Visitor Center exhibit.
- **Habitat Key**
Students will use this map to locate the habitat where their field trip occurs.



- **Bird Observation Chart**

Students will use these sheets to record their bird sightings.

- **Layers of Forest Life**

Students will show where some of their bird observations occurred with respect to their location (in tree, under tree, on ground, etc.)

- **Site Map**

If birds are not found in relation to a forest, students may use this sheet to draw the general environment and where birds were found.

- **Evidence Hunt**

Students may observe signs of birds in addition to seeing birds. Students may place marks in each box indicating the number of times that they've seen a particular sign of birds.

- **Optional: How Can I Capture My Experiences in a Story, Poem, or Drawing?**

Students may choose one of the activities to complete while on their field trip.

4. Review What Students Should Bring on the Field Trip

Refer to chart in the Teacher Preparation section, page 4.

Tips for Creating Field Journals



Journal Tips

Materials

- ☐ Field Journal Sheets for each student, teacher, and chaperone
- ☐ One package blank paper and one package lined paper
- ☐ Colored paper, cardstock, or cardboard for journal covers
- ☐ Magic markers or colored pencils for decorating covers
- ☐ 3-hole punch
- ☐ String, binding tape, or twigs and rubber bands for binding
- ☐ Pencil on a string for each student
- ☐ Two plastic pencil sharpeners and extra pencils for field trip
- ☐ One box of large ziplock bags to rainproof journals

Procedures

1. Photocopy all of the unit handouts and provide each student with double-sided copies. Use recycled paper if it is available.
2. Provide five additional blank sheets of paper and five lined sheets of paper for each student.
3. Have students create front and back covers for their journals using blank sheets of paper.
4. Have students bind their journals using binding tape, hole punches and string, cardboard, or a twig bound by rubber bands threaded through holes.
5. Once journals are bound, have students decorate the covers.
6. Have each student attach a sharpened pencil on a long string through a hole in the journal binding.
7. Have each student use a magic marker to write their name on the front cover of their journal.
8. Students will need a sturdy writing surface behind their field journals. Incorporate cardboard as the last page or have clipboards available for each student.

Extension ideas

1. Create a journal that is used throughout the year.
2. Share student journals with parents at open houses.
3. Students may choose to use their journals to create a class newsletter, resource newspaper, or a class website.



Safety and Stewardship Challenge



Pre-
Visit

Lesson Plan

Students will learn methods for observing birds and understand proper behaviors in a National Park. This will be accomplished by simulating a group "game show" and completing the first page of their field journals.

Time required: 1 hour

Location: classroom

Suggested group size: any

Subject: science

Concepts covered: low impact use of natural areas, behaviors in a National Park, safety

Written by: Christie Denzel Anastasia and Lynne Dominy,
National Park Service

Last updated: 06/20/00

Student Outcomes

At the end of this activity, the students will be able to:

- List three safety precautions for upcoming field trip
- List three proper behaviors for bird watching
- Understand concepts of National Park System and stewardship

National Science Standards Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard F - Personal Health: Injury Prevention; Populations, resources, and environment

Materials

To be provided by the teacher:

- Desk bell (or other device to indicate which team has the first answer)

To be photocopied from this guide:

- **Safety and Stewardship Challenge Questions** Teacher Information Sheet (one set)

Vocabulary

stewardship

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Procedures

1. Divide Class into Teams.

Option A: If class can work as large teams, divide the class into two teams. Each team will need a spokesperson and team name. Answers will come from the entire group. Spokesperson can change throughout the game.

Option B: If class may get too loud, students can still be divided into teams, but answers will come from individuals on each team. One person from each team will be assigned a number. Team A and Team B will each have a #1, #2, etc. Randomly choose a number from hat. The student with that specific number from each team will be responsible for answering the question. Random choice of numbers will help students pay attention if they aren't quite sure when their turn will occur.

2. Draw Challenge Grid and Scorecard on blackboard.

There are four categories with questions of varying value. As a finale, there is a final challenge question. Draw this grid on the chalkboard:

Safety and Stewardship Challenge			
Category #1 Take Care of Yourself	Category #2 Minimize Your Impact	Category #3 Bird Watching Etiquette	Category #4 The National Park Service
1 point	1 point	1 point	1 point
2 points	2 points	2 points	2 points
3 points		3 points	
4 points	3 points	4 points	3 points
		5 points	
Final Challenge			

3. Choose Game Show Hosts.

Option A: Teacher is responsible for asking all of the questions.

Option B: Four students will become "Challenge Hosts". Each student receives questions for a specific category and will ask appropriate questions according to point value.



4. Rules of the Game

- A coin flip will determine which team goes first.
- The game will end when a predetermined time runs out or when all questions have been answered.
- Team will decide which category and value of question will be asked.
- Spokespersons or individuals will poise themselves on either side of the desk bell with one hand behind their backs.
- After the question is asked, the first team to have an answer will ring the bell and respond. If they are correct, the team receives the full point value.
- If they are incorrect, the other team gets a chance. If they also get it wrong, the first team can try again for one less point.
- When brainstorming answers, students should whisper, or the other team may hear their answer.
- When all of the categories are complete (or 5 minutes before a predetermined "game-over" time), class will go into "Final Challenge". Each team decides on amount of wager, listens to question, and writes down answer on a sheet of paper. Each team reveals answer.
- At the end of the game, the team with the most points "wins," but everyone wins if your visit to Point Reyes National Seashore will be safe for themselves and the resources.

5. Complete First Page of Field Journal.

Using the information gained in this "game show", have students list at least three items under each category on the first page of their journal (**Things to Remember While on Field Trip**). Use the **Safety Issues: Resident Birds** Teacher Information Sheet (page 73) as a guide.

Safety and Stewardship Challenge Questions



CATEGORY #1: Take Care of Yourself

1 point

Bring a water bottle and drink plenty of water because...

- A you will not be able to speak well with a dry throat.
- B not drinking enough water can give you a headache and cause you to make bad decisions.**
- C a heavy water bottle will slow you down as you are walking.
- D all of the above

2 points

If the sun feels warm, you should...

- A try to get a tan.
- B use sunglasses, sunscreen, and/or a hat.**
- C take off your shoes and walk barefoot.
- D all of the above

3 points

Cliff edges in Point Reyes National Seashore are...

- A made of granite and safe as long as you have one foot flat on the ground at all times.
- B sandy, loose, and slippery; be careful at all times.**
- C safe if you have good balance.
- D the best places for a good view.

4 points

The best way to dress for a field trip:

- A comfortable, closed-toe shoes.
- B a T-shirt and a heavy, waterproof jacket.
- C "like an onion," many thin layers with a waterproof one on the outside.**
- D A and C



Safety and Stewardship Challenge Questions

CATEGORY #2: Minimize Your Impact

1 point

When visiting Point Reyes National Seashore, you should stay on trails because...

- A you are more likely to pick up a tick in grassy areas.
- B when you travel off-trail you can damage plants.
- C you are speeding up erosion.
- D all of the above**

2 points

It's okay to take home just one rock from Point Reyes National Seashore:

- A Sure, it's just one, but let your teacher know.
- B No, every rock is home to many bugs and plants.
- C No, with 2.5 million visitors, the Seashore would be rock-less if every visitor collected just one.**
- D B and C

3 points

Trash is....

- A okay to hide behind bushes in a National Park because it will eventually break down.
- B not a good source of food for hungry animals.
- C not a part of the Point Reyes National Seashore ecosystem and should be properly disposed of whether it's your trash, or trash that someone else accidentally dropped.**
- D only the responsibility of the maintenance staff, wherever it is.

Safety and Stewardship Challenge Questions



Teacher Information

CATEGORY #3: Bird Etiquette

1 point

To identify birds, you would use...

- A a bird field guide.
- B a dictionary.
- C an experienced bird watcher.
- D a and c**

2 points

If you find a nest with eggs in it, it's appropriate to...

- A collect the eggs and take them home to hatch.
- B pick them up to examine and identify them.
- C move away slowly and quietly, leaving them alone.**
- D stay close and wait for the parents to return.

3 points

The best way to see a bird up close is to...

- A sit quietly and use binoculars or a spotting scope.**
- B leave the bird some crumbs from your lunch.
- C sneak up on it.
- D call the bird to come to you.

4 points

Feeding birds is harmful to them because...

- A it changes their natural behavior.
- B it makes it easier for the neighborhood cats to catch and kill them.
- C it can create a dependency on humans to provide their food.
- D all of the above**

5 points

If you come across a bird appearing sick or injured, you should:

- A try to capture the bird and seek medical attention.
- B leave the bird where it is but report the location, species, and your observations to someone who may be able to help (Park Rangers in National Parks, wildlife or "wildcare" rehabilitation facility in other areas).**
- C take it home to care for it.
- D get as close as possible to observe what is happening.



Safety and Stewardship Challenge Questions

CATEGORY #4: The National Park Service

1 point

Which of the following is not in the National Park Service?

- A Grand Canyon National Park, AZ
- B Keweenaw National Historical Park, MI
- C Monterey Bay Aquarium, CA**
- D Golden Gate National Recreation Area, CA
- E Yosemite National Park, CA

2 points

You should treat Point Reyes National Seashore with respect because...

- A it belongs to everyone in the entire United States.
- B it preserves a part of the ecosystem you live in and depend on.
- C it's one of the few places natural processes can happen with little intervention from human society.
- D all of the above**

3 points

Which of the following is the mission of the National Park Service?

- A Preserve natural and cultural resources.
- B Provide for the enjoyment, education, and inspiration of this generation.
- C To care for special places saved by the American people so that all may experience our heritage.
- D Cooperate with other resource-conservation and outdoor-recreation organizations in our country and the world.
- E all of the above**

Bonus for one additional point:

Is the mission of the National Park Service a law?

Yes. The 1916 Organic Act mandates the National Park Service to preserve and protect the natural and cultural heritage of the United States for the enjoyment of its citizens, leaving them unimpaired for the enjoyment of future generations.

FINAL CHALLENGE

This question is worth the amount that each team agrees to wager.

What does stewardship mean?
Teacher is the final judge on this answer.

Safety Issues: Identifying Resident Birds



Personal Safety

- Watch where you are walking; the ground may be rocky and uneven.
- Stay with your group.
- Drink plenty of water to avoid dehydration.
- Protect yourself from the sun's rays; use sunscreen and/or a hat.
- Stay on paths and in picnic area. Grassy areas may have ticks known to transmit Lyme disease.
- Be aware of personal allergies or conditions that may cause concern on the trail.

Bird Viewing Tips

- Always observe birds from a distance.
- Remember, if you point at birds, they may fly away.
- Use binoculars and spotting scopes.
- Watch quietly, whisper. Move slowly or birds may fly away.
- Keep away from nests, nesting colonies, and important feeding areas.

Remember... You are in a part of the National Park System

- Point Reyes National Seashore is a natural area set aside to protect living and nonliving components of an ecosystem. Treat everything with respect.
- Allow plants and rocks and everything to continue their existence as part of an ecosystem by leaving things as they are found.
- Stay on established trails.
- Pack out trash or use garbage cans.

How Do I Use Binoculars?



Pre-
Visit

Lesson Plan

Students prepare for upcoming resident birds field trip by becoming familiar with binocular structure and use. The key to bird watching is being able to locate the the bird first without binoculars, and then to quickly relocate the bird again with binoculars.

Time required: varies

Location: in class and/or sections at Bear Valley Visitor Center

Suggested group size: entire class

Subject: physics

Concepts covered: binocular structure and use

Written by: Christie Denzel Anastasia, National Park Service

Last updated: 09/31/00

Student Outcomes

At the end of this activity, the students will be able to:

- Understand the structure of binoculars
- Practice focusing on moving images with binoculars

California Science Standard Links (grades 6-8)

This activity is linked to the California Science Standards in the following areas:

- 6th grade 7b - appropriate tools/technology to perform tests, collect/display data
- 7th grade 6b - to see an object, light emitted/scattered must enter eyes
6d - simple lenses used in optics
7a - appropriate tools/technology to perform tests, collect/display data

National Science Standard Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A - Abilities necessary to do scientific inquiry: Use appropriate tools and techniques to gather, analyze, and interpret data.

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Materials

To be provided by the teacher:

- Resident Birds Kit and 20-40 pairs of binoculars (available for checkout at Bear Valley Visitor Center)

Procedures

Note: This lesson can be done in various stages depending on whether or not students have access to binoculars in class.

If students can **bring in a pair** of binoculars to use in class:
this entire lesson can be conducted in class.

If students can **share a pair** of binoculars to use in class:
Procedures 1 and 2 can be taught to entire class. Student teams can experiment with binoculars in 10-minute intervals throughout day.

If students **do not have access** to binoculars:
Procedures 1 and 2 can be conducted in class, Procedure 3 at Bear Valley Visitor Center when students receive individual binoculars from the Resident Birds Kit.

1. How Do Binoculars Work?

In Theory: Before prisms were available, lens barrels had to be very long to increase the distance between eyepiece lens and objective lens to achieve magnification. These are the traditional "pirate scopes." With the introduction of prisms, the light was bent and barrels made shorter. Binocular vision allows two images to become one for depth perception. Monoculars are like binoculars, but made for one eye and provide no depth perception.

In Structure: There are four main components of binoculars. Power is a function of these components. A 6x30 binocular has 6x magnification and a 30-millimeter lens. A larger lens lets in more light.

Eyepiece Lens: There are several convex lenses here for magnification. This is the lens closest to your eye.

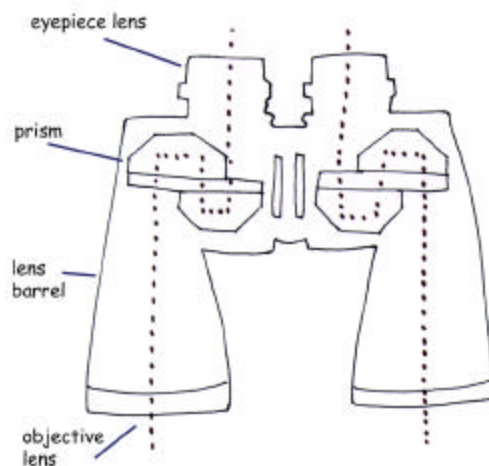
Prism: Bends light rays and returns reverse image to normal.

Lens Barrel: Keeps distance between eyepiece lens and objective lens. Blocks side lighting and protects from dirt.

Objective Lens: Gathers light in a convex lens. This is the lens that has a millimeter measurement (i.e., 6x30).



Diagram of Binocular Design



2. How Do I Get Binoculars to Work Specifically for Me?

Taking care of binoculars:

- Always keep them attached around your neck so they aren't accidentally dropped.
- While you are focusing binoculars, stand still. It would be easy to fall while focusing and walking.
- Clean binoculars properly.

If you wear eyeglasses:

- Keep your eyeglasses on.
- There is usually an "eye cup" rubber piece that folds back where your eyeglasses meet the eyepiece lens.

Things you adjust once:

- Barrel distance: The two barrels can be moved closer or further apart depending on the distance between your eyes.
- Focus right eyepiece: There is a knob on the right eyepiece that corrects for visual differences between your two eyes. If you are seeing more than one image, adjust the right eyepiece until there is one image.

Things you need to adjust with each observation:

- Center focus: Adjust the center focus with each observation to bring image into view.

Focusing on an image:

- Adjust barrel distance and right eyepiece
- Locate the image with your eyes. Are there any landmarks or reference points next to the image? These may help you find the image using the binoculars.
- Focus your eyes on the image. Without looking down, place the binoculars directly in front of your eyes. The rubber cup surrounding the eyepiece lens should rest against your eyebrow (unless you are wearing eyeglasses).
- Focus image into view with center focus. Keep elbows tucked in close to your body and both hands on binoculars to avoid a shaky image.



3. Practice Using Binoculars

Focus on a stationary object.

- Pick an object that doesn't move. Choose one somewhat near and one somewhat far. Use center focus.

Focus on moving objects in class.

- Right/left: Have a student walk slowly across the classroom while students use binoculars to keep in view. Speed up student walker to add a challenge.
- Away/toward: Choose a student to move toward and away from binoculars. Discuss range at which binoculars will work. At some point, object is too close to focus.

Focus on multiple moving objects at school.

- Attend a sporting event or practice at a lunch session in the cafeteria.
- Place a wildlife poster on a piece of cardboard and stick. Have a student move around the classroom with the posterboard: slow, fast, up, down, toward, away.

Focus on wildlife.

- Bring class outside in an area where they are likely to view moving wildlife such as birds.